Middle Level Mathematics Content Standards

Standard 1: Middle level mathematics teachers understand and use the major concepts, theories, and development of number sense, numeration, numerical operations, and algebraic thinking.

Middle level mathematics teachers:

Indicator 1: Demonstrate number sequences, patterns, and functional relationships as they apply to real numbers.

Indicator 2: Demonstrate numeration systems with physical models.

Indicator 3: Develop symbolic logic, induction, and equivalence relations.

Indicator 4: Develop and apply number theory concepts in mathematical problem situations and in real world settings.

Indicator 5: Demonstrate basic set theory.

Indicator 6: Use software for promoting and extending concepts of numeration.

Standard 2: Middle level mathematics teachers understand and use the major concepts of geometry, measurement, spatial sense, and the properties of relationships of two- and three-dimensional space.

Middle level mathematics teachers:

Indicator 1: Demonstrate Euclidean geometry.

Indicator 2: Use reasoning, conjecturing, and written arguments to verify generalizations and develop proof.

Indicator 3: Apply transformations in two- and three-dimensional space and use and explain congruence, similarity, and symmetry.

Indicator 4: Use various representational systems to solve problems.

Indicator 5: Demonstrate geometric connections within mathematics, other content areas, and life situations.

Indicator 6: Use spatial reasoning and visualization to solve problems.

Indicator 7: Use systems of measurement within mathematics, other content areas, and life situations.

Indicator 8: Use technology to develop and apply geometric concepts.
Standard 3: Middle level mathematics teachers demonstrate knowledge of the major concepts, theories, and development of patterns, relationships, and functions.

Middle level mathematics teachers:

Indicator 1: Use algebraic processes, concepts, and techniques to solve a variety of relevant and authentic problems.

Indicator 2: Represent situations and number patterns with tables, graphs, verbal rules, and linear and non-linear equations, and explore connections between these representations.

Indicator 3: Use physical models, charts, graphs, equations, and inequalities to describe mathematical relationships in and out of the classroom.

Indicator 4: Use diverse examples of functions arising from a variety of problem situations and investigate the properties of these functions through appropriate technologies, including graphing utilities and graphing calculators.

Indicator 5: Use realistic problems involving areas, volumes, curve lengths, average and instantaneous rates of change, and relate these problems to the concepts of differentiation and integration.

Indicator 6: Use matrices to represent systems of equations and solve problems making use of technology as appropriate.

Indicator 6: Demonstrate recursive definitions of sequence and functions, and use recursion and technology to model these processes.

Standard 4: Middle level mathematics teachers understand and use the major concepts of probability and statistics including collecting, displaying, analyzing, and drawing conclusions from data.

Middle level mathematics teachers:

Indicator 1: Demonstrate an ability to formulate questions, design studies, and collect data to address those questions.

Indicator 2: Represent data in a variety of dispersion and central tendencies.

Indicator 3: Use statistics and probability as valuable strategies for decision making.

Indicator 4: Develop and evaluate inferences, predictions, and arguments that are based on data from a sufficiently large and unbiased sample.

Indicator 5: Use organized lists, permutations, and combination to construct a sample space for determining theoretical probabilities and understand the connection to experimental probabilities.

Indicator 6: Use appropriate technology to collect, display, organize, and interpret data.
Standard 5: Middle level mathematics teachers understand and use the processes of problem solving, reasoning and proof, communication, connection, and representation as the foundation for the teaching and learning of mathematics.

Indicator 1: Middle level mathematics teachers understand and practice a variety of problem solving strategies.

Indicator 2: Middle level mathematics teachers understand and practice reasoning and proof as aspects of mathematics.

Indicator 3: Middle level mathematics teachers understand and use a variety of strategies to communicate mathematics.

Indicator 4: Middle level mathematics teachers identify and use connections that facilitate mathematical understanding.

Indicator 5: Middle level mathematics teachers understand and use mathematical representations.

Standard 6: Middle level mathematics teachers understand and use a variety of instructional strategies and tools to promote student understanding of mathematics.

Indicator 1: Middle level mathematics teachers recognize students’ level of mathematical understanding in order to implement the appropriate instructional practice.

Indicator 2: Middle level mathematics teachers are able to identify, prescribe, and use a variety of tools.